

NAVY MEDICINE

July-August 1990



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COVER: At the Field Medical Service School (FMSS), instructor HMC C. Hayden secures IV tubing on a manikin arm following intravenous catheterization. Since *Navy Medicine* visited FMSS a few years ago, there have been some dramatic changes. Story on page 12. Photo by the Editor.

Where We Stand

The mid-year financial review is over. We have survived, but not without a dear price to our shipmates. I have chosen to raise this topic for discussion not to triumphantly wave the flag of Navy medicine, but to explain to each of you the gravity of the current and future resources environment in our community.

Many of our Navy medical treatment facilities have announced that they may have to curtail operations before the end of the fiscal year for lack of funds. Even the DOD hiring freeze has been a two-edged sword. Where in some cases a savings has been realized, the impact on operations has been severe and occasionally crippling. This is the environment in which we must accomplish our mission. This is the environment in which we went to the budget table. Normally, this would be an extremely strong bargaining position. And, in fact, it is. We received **40 times** more than any other claimant. But it wasn't enough; the dollars we need just aren't in the bank, and the situation is not likely to change.

Regardless of the news media one chooses, it is almost impossible to avoid the message of "peace breaking out all over." The "peace dividend" expected by the American public cannot be generated immediately, but has already been claimed by contesting Congressional factions. Requests for additional funds in this climate are met with skepticism. It is easy to understand: If the military is scaling down, why must this one faction, this small sliver of the defense pie known as Navy medicine, insist that it must grow? My answer is, and always will be, that our sailors and marines, their families, and our retirees are entitled to quality medicine, and our mission is to continue to provide it.

Fortunately, SECNAV and CNO agree. The Navy budget is about \$100 billion, and BUMED is one of the smaller claimants of that money. At the mid-year review, we were granted only half of what we requested—just enough additional funds to keep our doors open. Yet, as I said earlier, this was more than 40 times what anyone else received, and it came at a cost. By providing BUMED with 93 percent of all available funding, the Navy assured our immediate survival, but at the expense of steaming days and flying hours. This sacrifice illustrates the importance our line counterparts place in the mission of Navy medicine, the value they place on medical care.

Navy leadership believes in us and our mission as shown at mid-year review. We must return this trust the best way we can. We must take care of our Navy and Marine Corps family. Only you can make that happen by working as a *team* to continuously improve all aspects of our enterprise. Read, take aboard, and practice our Navy Medical Department Guiding Principles.

Between the time this was originally written and submitted for final review, we have deployed forces to Saudi Arabia. Navy medicine has been heavily taxed and has responded magnificently. We find ourselves in the paradoxical position of an expensive military buildup within the budget picture noted above. It is one of those things which needs sorting out.

I want all of you to know how very proud I am of your performance, your dedication, and your sacrifice. CHARLIE GOLF ONE.

VADM James A. Zimble, MC



Navy divers in their natural environment. QMC (DV) Terry Miranda (left) and HT2 (DV) Bob Bekesz tread the waters near the Seventh Fleet Guided Missile Cruiser USS *Sterett* (CG-31) in Subic Bay.

Department Rounds

Navy Dive Locker Gives Humanitarian Support

The first job of Ship Repair Facility's diving and salvage unit is to help make underwater repairs to Seventh Fleet ships in port at Subic Bay, R.P. But the 13 assigned Navy divers are spending an increasing amount of time assisting in a more humane reconditioning—the treatment of area divers with “the bends.”

“The bends is nitrogen bubbles forming in the bloodstream, which happens when a diver returns to the surface without following a proper decompression schedule,” said Master Chief Hull Technician (SW) John Searcy, a Navy master diver and 30-year veteran of the sport and profession. “It can cause severe pain,

numbness, and paralysis, depending where the air bubble lodges in the body."

Searcy said that medical diving officers and technicians are treating up to 35 cases a year in the dive locker's decompression chamber. "Navy divers are well trained and it's rare for them to get the bends," he said. "Ninety-five percent of our treatments are done for civilians."

Searcy said that some crude methods and equipment used by many Filipino commercial divers don't hamper their determination. "They attach one end of a garden hose to an air compressor and they pinch the other end between their teeth," he said. "Then, with flippers made of plywood with rubber straps, they dive for fish, coral, scrap metal, whatever."

"They make some fantastic dives and average about 150 feet for 2 hours per dive. And they'll make four or five dives a day. For them, it's a matter of necessity. They can make as much money from 1 day of diving as from 2 or 3 months of typical farm work."

Searcy said the area divers know of the decompression chamber and will come for treatment after a problem arises—but not always immediately. "If they're only suffering pain in the joints, they'll keep diving," he said. "They'll wait until it's serious enough to keep them out of the water."

"On one occasion, a diver floated to the surface unconscious. His partners tied him to an anchor and threw him overboard. They went down with him to about 40 feet and kept an air hose in his mouth until he regained consciousness. Then they brought him to us."

The most serious problem the dive locker sees, Searcy reported, is called gas embolism. "It's caused by people diving with compressed air, such as a scuba bottle. For some reason—either they run out of air or a hungry critter scares them—they make a mad dash for the surface while holding their breath."

"As they're coming up, the pressure

around them is decreasing, and the pressure in their lungs is increasing because they're not exhaling. The pressure has to go somewhere. Most of the time it ruptures a lung lining. And if it's serious enough, the air bubble will follow through the bloodstream to the heart and up to the brain. That can produce some severe neurological problems. If it's not treated properly, it can cause death."

A gas embolism patient can be treated in the chamber. But the medical attendants must be careful. If treatment begins within 4-6 hours after the incident, the treatment requires the chamber to equal the pressure of a diving depth of 165 feet.

"With 165-foot treatments, the doctors and technicians are at a disadvantage because of nitrogen narcosis, also called 'rapture of the deep,' where a state of drunkenness can be experienced. During these treatments, we

have another doctor outside the chamber because the doctor inside may have his judgment impaired."

Not everyone who dives will end up in a decompression chamber. And the diving and salvage unit does more than treat diving maladies. "Along with repairing ships and providing humanitarian support for the Filipinos, we use the chamber to test candidates who want to attend Navy diving school."

Graduates of Navy salvage, SEAL, and Explosive Ordnance Disposal diving programs prove daily that commercial and sport diving can be done safely. Education is the key, Searcy insisted. Knowing the depth and time limits of a dive, and following any required decompression schedule, will ensure a dive remains profitable or pleasurable—without being too costly! □

—Story and photos by PH1 Ted Salois, Seventh Fleet Public Affairs, Subic Bay, R.P.

HM1 (DV) John Kuntz and a patient in the diving and salvage unit's decompression chamber at Naval Station's Ship Repair Facility. Technicians at the dive locker say they have been treating an average of 35 cases of the bends each year.



Helping Hands



Today's computerized world of high technology has changed the field of medicine dramatically. Although this technology has contributed to portions of rehabilitative medicine, there remains areas that require a "hand-on" approach and plain old hard work to achieve maximum results.

At Naval Hospital, Portsmouth there is a clinic that has a unique method to return sailors and marines to full duty in the most efficient and expeditious way possible. Working mostly with a variety of hand injuries, the Occupational Therapy Department realized the importance of an active duty patient's reliability in the performance of his/her job upon return to duty. CDR Robert C. Zila, head of the department, identified the problem.

"We were finding that albeit our tests and measurements indicated that the patient was ready to return to duty, the patient was not ready, in a practical sense, to assume all duties of his/her rate. For example, a boatswain's mate that has recovered from multiple tendon surgery and therapy is expected to begin to use a heavy pipe wrench or open a valve over his head

when he returns aboard his ship. After 12 weeks recovery time, this strenuous activity may be very difficult to do and may even result in a reinjury.

"There's a great difference between squeezing a grip dynamometer to assess strength and actually utilizing a heavy pipe wrench or opening a stubborn valve. We've had personnel reinjure themselves just by performing the job that they are expected to do when they return to duty."

This problem prompted Zila to construct rehabilitation equipment unique to the needs of sailors and marines. The design was based on the "work-hardening" approach utilized by the well-known Hand Rehabilitation Center in Philadelphia, PA, used to return patients to work. At the Philadelphia center, patients exercised and improved their work tolerance by lifting weighted boxes, woodworking, and other common work-related tasks.

In the Portsmouth clinic, however, sailors and marines "work out" in a mock-up version of a ship. There are valves, ladders, quick-acting watertight hatches, nuts and bolts, and tools that relate to shipboard jobs.

About 3 years ago, Zila started with

"2-by-4" pieces of lumber, a ship's ladder, a few valves, and even a hatch cover. These bits and pieces were roughly assembled in one of the treatment rooms where patients began to utilize it for job-related therapy.

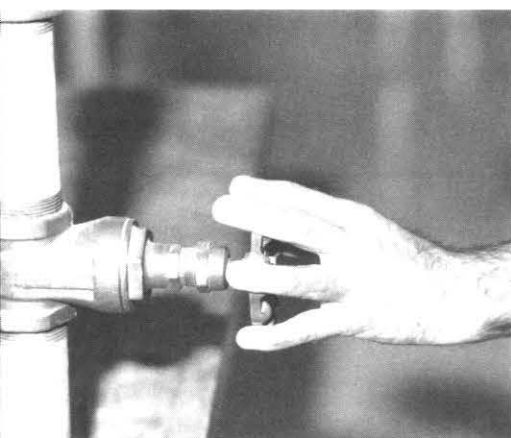
A Navy captain from Portsmouth's inactive shipyard was referred to the occupational therapy clinic for treatment of a hand injury. He was immediately fascinated with this rough shipboard mock-up and asked, "What the heck is that for?" The concept was explained to him, and he at once understood how beneficial such a therapeutic device was to the active duty patient. He became an active supporter and a source of salvage material such as doors, valves, ladders, and other materials that otherwise would have been discarded. Through the guidance of Zila and with the cooperation of the captain, the rehabilitation device soon resembled the interior of a ship and was unofficially christened the *USS Helping Hands*.

The "ship" is presently helping in the rehabilitation of over 300 hand-injured patients a month. "The Occupational Therapy Department treats two to three new tendon laceration patients every week resulting from a



HN Christian B. Bailey measures the range-of-motion on ADAN George R. Takacs' arm as part of the evaluation process in the Occupational Therapy Department.

JO1 Bill Koppinger



Turning valves on board a ship is a task often taken for granted; for a sailor receiving therapy as a result of an injured tendon, the task could be beyond his/her abilities.

variety of causes," according to LCDR E.N. Clark, who supervises the hand therapy section. Clark stated that, "Upper extremity fractures, especially in the hand make up the rest of the workload. Several of the injuries are work-related, such as hatch cover crush injuries or tool injuries, while the majority are home, hobby, or sports-related, such as carving knife injuries or table saw injuries."



HM3 William Dobbins

JO1 Bill Koppinger

Patients are referred to occupational therapy via a surgeon after repair of lacerations or fractures. In the first stage of treatment, low-temperature plastic splints and traction devices will most likely replace heavy plaster casts or bulky dressings. From this point, according to Clark, "It is imperative that our patients in hand therapy be counseled so that they understand what we're doing and why we're doing it. Our dynamic approach, especially with tendon lacerations and state-of-the-art splinting, requires that our patients understand their injuries and be responsible to do what we ask them to do."

Portsmouth's *Helping Hands* has already begun to prove itself in reducing loss of work time and adjustment problems upon return to work. Patients using this innovative approach to their rehabilitation have achieved improved range of motion, strength, and sensation through graduated strengthening and timed activities.

BM2 Whitlow, a patient at Naval Hospital, Portsmouth, performs a normal shipboard routine of securing a hatch as part of his therapy program involving the mock ship *Helping Hands*.

The staff assesses daily shipboard activities requiring manual dexterity and researches various problem areas. This research will enable the staff to perhaps identify ways of preventing some of the more common shipboard injuries through design features, procedures, and safety considerations. Zila also believes that this approach "shows that we are not only committed to providing state-of-the-art therapy to our patients, but also that we are interested in them, their work, and in their living and working environment."

This "ship" is also dynamic and progressive in that parts may be added or deleted in order to meet the job needs at a very minimal cost. Plans are underway to incorporate the "ship" with a computerized work-hardening machine that will allow the staff to analyze and virtually duplicate any work-related requirement while continually monitoring progress. The capability of this machine will graph a patient's progress from using a wrench to assessing a marine pulling a rifle trigger.

Again, Portsmouth has lived up to its reputation of being "the first and finest." This 128-square-foot "ship" is the Navy's first work-hardening, job-related form of therapy. While the USS *Helping Hands* is a "ship" that will never sail, it will nevertheless lead the way as it cruises on a therapeutic mission for the active duty patient. □

—Story by JO1 Bill Koppinger, Naval Hospital, Portsmouth, VA.

Reserve Doctor Caught in Panama Invasion

JO1 Harry C. Kenyon, USN

What began as a trip to Panama to visit an ailing relative turned out to be an extraordinary turn of events for a Naval Reserve doctor.

While taking care of family matters in Panama City, Dr. Miguel Arcacha, assigned to NAS New Orleans (LA) Branch Clinic 0174, found himself in the middle of the invasion of Panama "Operation Just Cause."

It was a late evening, Dr. Arcacha and his wife, Susana, had just finished dinner and were relaxing over drinks with friends. Something strange was happening, an uneasy tension stirred the cantina as parents came to gather their teenagers. The friction between Panama and the United States had increased over the past week since the killing of an American marine and the brutal harassing of a naval officer and his wife. The Arcachas had been warned that Panama was getting increasingly dangerous for Americans.

"I knew things were getting worse. I was uneasy and I didn't like it," Arcacha recalls. "Our friends in the States told us not to go. Once in Panama, I noticed a tension in the air . . . it was a funny feeling, not hostile, but people were acting strangely."

The Arcachas were worried, having traveled there with their children, Analisa, 13, and Felipe, 11. But the trip was urgent; Susana's father was seriously ill so they decided to take the chance. In 15 years of visiting Panama, Dr. Arcacha had never experienced anything like the strange feelings he had then.

It was just before midnight, suddenly a man burst into the cantina. "The Americans are invading, everyone go home," he yelled in Spanish. At that moment the sky was streaked with the glow of rockets and gunfire echoed through the streets. Dr. Arcacha and

his wife ventured outside. American forces were pouring into the city and the major fighting was occurring in the area where they were staying, where their children were being watched by Susana's family.

Sections of the city were closed off. So in the early morning of 20 Dec 1989, Dr. Arcacha and his wife made their way to his sister-in-law's house, to spend the night, only a half-mile from the airport where American forces were involved in heavy combat. Phone lines were out; they would have to wait until morning to learn of the welfare of their children.

The next day tanks rolled through the streets and shots resounded as

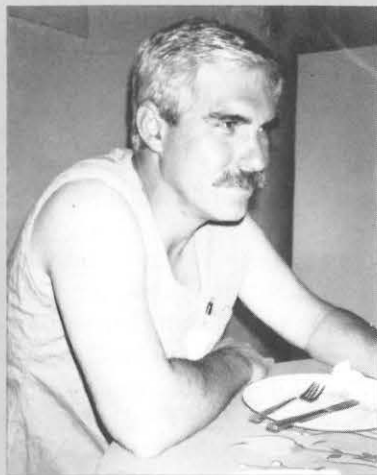
American troops swept through Panama City. Word came that the radio station across the street from Susana's family had been destroyed after a broadcast by Panamanian dictator Manuel Noriega. Dr. Arcacha could not rescue his children.

"What worried me most in the first few days after the attack was the safety of my wife and children due to the fact that we could have been taken hostage," noted Dr. Arcacha. Finally they received a phone call—the children and Susana's family were safe.

Dr. Arcacha, a Naval Reserve commander, realized the seriousness of the Panamanian invasion. "My country is at war, I have to do my part," he

thought. He decided he must do something to protect his family and assist the American efforts. "My major concern was that I heard through radio broadcasts that they were taking American citizens as hostages," states Arcacha. Obviously, I was in double jeopardy for being an American citizen and a member of the military. For all practical purposes, I would have been a pretty good target for them."

On the third day of the invasion, the Arcachas returned to their family's home. Looting had begun. "Dignity battalions" shot out display windows and looters emptied stores and shops of everything which could be carried. Arcacha saw people being forced at



Dr. Arcacha relaxes after performing surgery at Gorgas Army Hospital.

CDR Miguel Arcacha, MC, USNR-R, is an aviation medical officer who drills at NAS Jacksonville (FL) Branch Medical Clinic. In civilian life he is a vitreo-retinal surgeon with a highly successful private practice in Sarasota, FL.

When he was 19, Arcacha, the son of a prominent Cuban lawyer, volunteered for the 1961 Bay of Pigs invasion after joining anti-Castro forces in the United States. When the invasion failed, Arcacha and others were driven to the sea by Castro loyalist troops. Escaping by a small boat, they spent 2 days adrift before the ocean currents washed the boat onto South Key Largo Island, a Cuban air base.

Again captured by the Cubans, Arcacha and 20 others were led to the sea for execution. Forced to face the ocean, they were lined up and told they would be shot. The Cuban platoon commander gave the order to "ready," "aim"—and while Arcacha and his fellow patriots held hands and sang patriotic songs, the command "fire" rang out. What he and his comrades then heard were the clicks of the firing pins on empty chambers.

After 2 weeks of hospital treatment for salt water ingestion, Arcacha was tried and sentenced to 30 years of hard labor. He spent the next 20 months at the La Cabana prison in Havana.

Arcacha gained his freedom through an arrangement with the U.S. State Department. The prisoners were released to the United States in exchange for American medical and agricultural equipment. As part of the agreement, the sentences were commuted to death if any of the prisoners were ever captured on Cuban soil.

To this day Miguel Arcacha lives with a death sentence.



After a machinegun exploded in his face, a member of the PDF underwent eye surgery at Gorgas Army Hospital. Dr. Arcacha performed the delicate operation at the request of MAJ Robert Smith, chief of ophthalmology.

gunpoint to give up their cars so looters could take their plunder. It became very dangerous to be on the streets.

When the stores were empty, the dignity battalions moved to the neighborhoods to pillage homes. To secure the neighborhood, Arcacha gathered some of the local men into a militia force. Armed with shotguns and pistols, they built barricades and kept watch against the looters. Although the media reported the operation as a mopping up, Arcacha said heavy fighting and sniper fire still gripped the city.

He contacted the American Embassy which, at the time of his call, was

under hostile fire. After repeated requests for assistance to get his family out of the country, he was told by an embassy official that he was on his own.

Realizing he was stranded in Panama, he directed the neighborhood militia to maintain their sector as he would try to get to the American Embassy to volunteer his skills as a vitreo-retinal surgeon.

Arcacha flagged down an American troop carrier and identified himself as a U.S. naval officer and asked them to take him to the Embassy. When he arrived, Arcacha noticed bullet holes

everywhere, the aftermath of an assault by Noriega loyalists.

After talking to embassy officials and volunteering himself to the American cause, Arcacha was driven to Gorgas Army Hospital in the Canal Zone, where years earlier he had completed 3 years of internship and met his wife. Gorgas was bustling as Panamanian and American wounded flooded the hospital. Immediately Arcacha began to triage patients and helped prepare American wounded for transfer to Howard Air Force Base, TX.

At the request of MAJ Robert Smith, MC, USA, the hospital's chief of ophthalmology, Arcacha was asked to conduct emergency vitreo-retinal surgery on a local civilian. The patient suffered from shrapnel in his eyes after a machinegun had exploded in his face. The patient, believed to be a member of the dignity battalion, was fortunate to have such a skilled surgeon. The operation was successful and, despite the severity of his injuries, his vision was restored.

For 2 days the fighting persisted and Arcacha continued to assist at the hospital until the major casualties diminished. When he returned to his neighborhood, he was pleased to see that the militia were still guarding their posts. Although daytime fighting had slowed, looting became more intense as dignity battalions launched nightly raids.

The neighborhood militia told Arcacha of many area homes in which PDF (Panamanian Defense Force) officers lived. They pointed to the house of LCOL Pascual Gonzales, a top Noriega advisor. They believed that he had taken shelter in the San Miguel hills after the American invasion.

Arcacha believed the only way to stop the fighting was to confiscate weapons and persuade Noriega loyalists to surrender. Realizing Gonzales likely held a cache of arms, Arcacha went to his home. Gonzales' sister answered the door. Arcacha said he was looking for LCOL Gonzales and wanted to search the house. Together with the militia, they collected a number of automatic weapons and



LCOL Gonzales, a top Noriega advisor, in custody following his surrender.

ammunition. Later that day, Arcacha received a telephone call from a terrified Gonzales.

Arcacha stated, "Gonzales telephoned me the following day from his hiding place wanting to surrender to me. I asked him 'Why me?' And he said, 'I'm scared for my life. I don't know how to speak English. If I surrender to the Americans they might hurt me, and if I turn myself into the Panamanians, they'll lynch me.'"

Arcacha went to Gonzales' home where the fugitive peacefully surrendered. Arcacha then escorted him to MAJ Richard Ballard, executive officer of the 82nd Airborne, together with the confiscated arms.

As the search for PDF members continued, leads from surrendering prisoners were paying off. Among them was the ex-Panamanian Ambassador to Libya, Mr. Herrera, known as a staunch Noriega supporter who was not under diplomatic pass. In a sur-

prise raid, Arcacha and his militia stormed his house and captured Herrera by force. He was also turned over to the 82nd Airborne.

Among the homes searched by Arcacha was one of a woman who was very friendly with Noriega and his wife. Known in Spanish as a "Santera," (a mystic dealing with Voodoo and black magic) the Noriegas came to her house regularly for spiritual advice. It was through this santera that Arcacha received a call from a woman identifying herself as the wife of Noriega who was in refuge at the Cuban Embassy. She asked him to help her find asylum and transportation out of the country. Arcacha, a native Cuban who spent 20 months in a Cuban prison following his capture at the Bay of Pigs, told the woman he would help her surrender to the Americans, or she could go to Cuba and rot. She did not want to surrender.

In the days that followed, the

mopping up by American forces was nearly complete. "Operation Just Cause" was winding down and Panamanians were busy reclaiming their city from the iron-fisted dictatorship of Noriega. The airport had reopened, and 3 weeks after the invasion began, Arcacha took a flight back to the United States. His wife and children stayed in Panama for another week, tending to family matters.

In retrospect, Arcacha tells of his thoughts and motivations during the invasion. "Being part of the military," he noted, "you're committed and responsible to your country. I had to do something. I couldn't hide and wait for the fighting to end, so I helped in the best way I knew how, in the capacity of a medical surgeon and as a military officer." □

JOI Kenyon is stationed at the Naval Air Reserve Jacksonville, Naval Air Station, Jacksonville, FL 32212-0004.

Assignment: Persian Gulf

Navy Orthopaedics in the Middle East

LCDR Dana C. Covey, MC, USNR



From January to March 1989, I served temporary active duty with the Commander, Middle East Force (COMIDEASTFOR) as the first Naval Reserve physician so assigned. The assignment was the result of a recommendation by the Reserve community to utilize Naval Reserve medical officers for direct support of high-tempo Persian Gulf and Arabian Sea operations. This proposal was endorsed by the Surgeon General of the Navy as part of the "total force" concept, whereby the Naval Reserve plays a key role in support of the active forces.

On short notice, I departed the United States in January 1989, traveling via Europe to Bahrain, an island state in the Persian Gulf. Bahrain is the

Dr. Covey (right), assisted by general surgeon LCDR Bob Lynch, MC, performs emergency surgery on a *Constellation* crewman who sustained severe hand trauma while working on the flight deck.

homeport for USS *LaSalle* (AGF-3), the flagship of COMIDEASTFOR, and also the location of Administrative Support Unit (ASU), a low-key, well-guarded compound which provides logistical support to ships and other units operating in the Gulf.

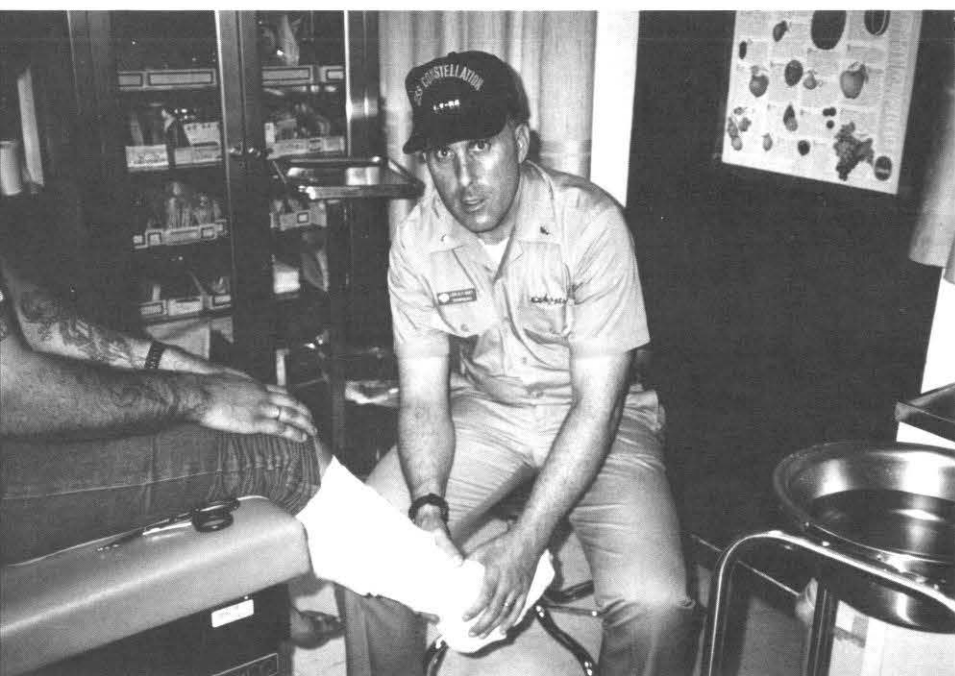
Upon arriving at ASU, I was greeted by CDR Jim Gaskens, the commanding officer, and assigned to the Medical Clinic located within the compound. While working in the clinic, I treated patients with orthopaedic as well as general medical problems. A number of patients with acute and chronic orthopaedic injuries stationed on ships operating in the Persian Gulf were referred to Bahrain after the word spread that a Navy orthopaedic surgeon was available at ASU.

While ashore in Bahrain I learned that it was imperative for American servicemen to keep a low profile due to the ever-present risk of terrorist attack. Uniforms were only worn within the confines of the ASU compound, which was purposely kept nondescript and did not fly the American flag.

In addition to clinic duties in Bahrain, I served as the attending physician on medical evacuation (medevac) flights over the Persian Gulf to transport sick and injured sailors from their ships to shore for further treatment. I also evaluated and treated patients from the "Hercules," a mobile sea base positioned far out in the Gulf which served as a platform for special operations. Some of these patients were Navy SEALs who sustained orthopaedic injuries during the course of their operational duties.

At the end of January, I left Bahrain for Muscat, Oman, to rendezvous with an aircraft (C-2) from USS *Constellation* (CV-64). After a brief layover in Muscat, I boarded the C-2 along with RADM Ken Carlson (COMCAR-GRU One) and his staff, who had been ashore for meetings with Omani officials.

Shortly after unpacking my seabag, I began seeing patients, many of whom had been waiting for months to see an



Dr. Covey applies a cast to a sailor with a badly injured ankle.

orthopaedist. I not only treated many sailors and marines with chronic musculoskeletal problems, but also a number of acute orthopaedic injuries ranging from fractures to amputations.

The patient mix included officers and men of the ship's company, embarked squadrons and staff, and personnel from other units comprising Battle Group Delta. Specifically, orthopaedic patients were evacuated by air from USS *White Plains*, USS *Valley Forge*, and USS *Sacramento* to receive orthopaedic care aboard *Constellation*.

Although the spectrum of orthopaedic complaints was broad, I treated many common chronic problems, including lumbar back and knee pain, frequently the result of the rigors of shipboard life. However, appropriate aggressive treatment of many chronic ailments allowed most personnel to stay on the job and off the binnacle list. Since orthopaedic patients in Battle Group Delta were evaluated on-station, the turnaround time for treatment and fitness for duty determination was minimized.

Orthopaedic problems encountered showed no boundaries with regard to rank, as patients ranged from seamen apprentice to rear admiral. In addition to patient care, I conducted inservice

training for *Constellation's* medical department on several orthopaedic topics and developed physical therapy protocols for patients with chronic and acute musculoskeletal problems.

When not seeing patients, there were many opportunities to learn about the different facets of carrier duty. I was fortunate to bunk with LCDR Tom Trotter, a true professional and superb F/A-18 pilot. He introduced me to the workings of a carrier squadron and took me under his wing as an unofficial member of VFA-25. As a physician normally exposed mainly to others in the health care field, the opportunity to meet and interact with many professionals from the line community was rewarding.

During my tenure aboard "*Connie*," we participated in several naval exercises and made port visits to Karachi, Pakistan, and the island of Diego Garcia. While in Diego Garcia, we conducted an orthopaedic clinic for American and British personnel assigned to the Naval Support Facility.

The battle group's port call to Karachi was initially touch-and-go due to anti-American rioting and other demonstrations sparked by Muslim indignation over recent publication of *Satanic Verses*, a book by British author Salman Rushdie. But the visit

proceeded as planned and there were no major incidents.

After 5 weeks on board, I detached from *Constellation* as the attending medical officer on an emergency medevac flight from the North Arabian Sea to Bahrain in the Persian Gulf.

During my second tour in Bahrain, I provided followup to a number of patients from ships of the battle group which had entered the Gulf for patrol operations. In this manner, continuity of care was delivered to those patients with relatively serious orthopaedic problems.

This Middle East assignment was both exciting and professionally rewarding. As the only Navy orthopaedic surgeon in this theater of operations, I was able to treat many patients and return them to their command rather than medevacing them out of the area. This saved the Navy many man-days and thousands of medevac dollars.

This opportunity to serve came about through the combined efforts of several individuals who saw such an assignment as precedent-setting for the Naval Reserve Medical Department. The strong support rendered by the staff at my Reserve center coupled with the efforts of the Bureau of Medicine and Surgery made this duty possible.

I strongly encourage other Naval Reserve physicians to consider the challenges and rewards of temporary active duty with our operational front-line forces. □

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FMSS Revisited



Taking up the rear on a 16-mile forced march is the wrong place to be. Powdery dry dust hurled skyward by tramping boots clogged my nose and settled on my camera lens. I recalled how historians had described the movement of armies: Stonewall Jackson's barefoot Confederates force marching up and down the

Situps the hard way. Physical conditioning is still an integral part of the FMSS course.



Photos by the Editor

Shenandoah Valley visible for miles, not so much by their gleaming musket barrels as by a distant, swirling cloud.

After 2 years I was back at Camp Lejeune, NC, visiting the Field Medical Service School (FMSS) (see "Field Medical Service School: Training a Different Kind of Corpsman," *Navy Medicine* January-February 1988). During that time several dramatic changes had been made in the curriculum, and I wanted to see firsthand how the new training was affecting the

school's final product—the FMF corpsman.

According to the FMSS's recent commanding officer, CAPT Jay Lamdin, MSC, the changes came as part of an effort to make the FMF corpsman even more combat-capable than previously. To accomplish this, knowledgeable personnel from the First, Second, and Third Marine Divisions—master chiefs who conducted training, and the division, group, and wing surgeons and their master

Above: After a torrid and dusty 16-mile forced march, CAPT Jay Lamdin, FMSS's recent commanding officer (right), leads his troops into the home stretch.





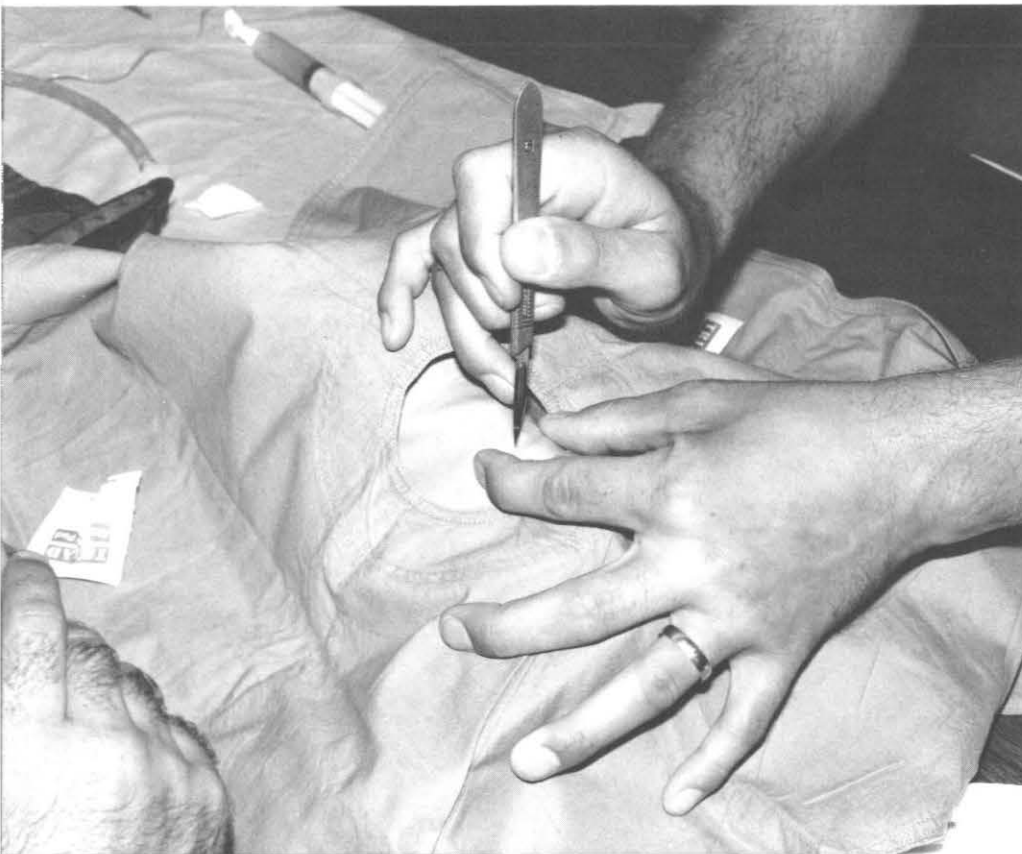
Opposite page: HMC Tim Brown evaluates a student's suturing technique. **Left:** Another student applies sutures using sterile technique while instructor HMC C. Hayden looks on.



HMC Donna Jackson (left) critiques a student's suturing technique.

chiefs—met. The conferees focused on and then adopted critical lifesaving skills—suturing, administering IVs, creating and maintaining airways—and combat skills such as maintaining rear area security and weapons proficiency training including familiarization with the new 9mm replacement for the standard .45 caliber pistol. Thirty-five additional rounds of ammunition have been added for practice on the range. Two and a half additional hours and 15 more rounds are now part of the training with the M16A2 rifle, the standard Marine Corps infantry weapon.

The primary focus, however, is on the lifesaving skills, which now total some 51 hours. The FMSS course has gone from a 5-week to a 7-week program. According to CAPT Lamdin, "The excitement among the students



A student begins an incision in preparation for an emergency cricothyroidotomy.



Using a number 3 scalpel handle, a student spreads the incision site, allowing for easy insertion of an endotracheal tube.

has become very apparent." Where before they merely had lectures, now for the first time they have had an opportunity to get hands-on experience with very lifelike rubber manikins designed specifically for honing specialized lifesaving skills. "This is as close to dealing with the human body as is possible," Lamdin points out.

Hands-On

Suturing. Suturing is the first subject the students practice. A large classroom with tables on either side serves as a lab. Instructors sit on one side, students stand on the other working on "anatomically correct" rubber arms complete with deep lacerations requiring stitches. The instructors, themselves experienced corpsmen, talk the students through the procedure following a prescribed checklist.

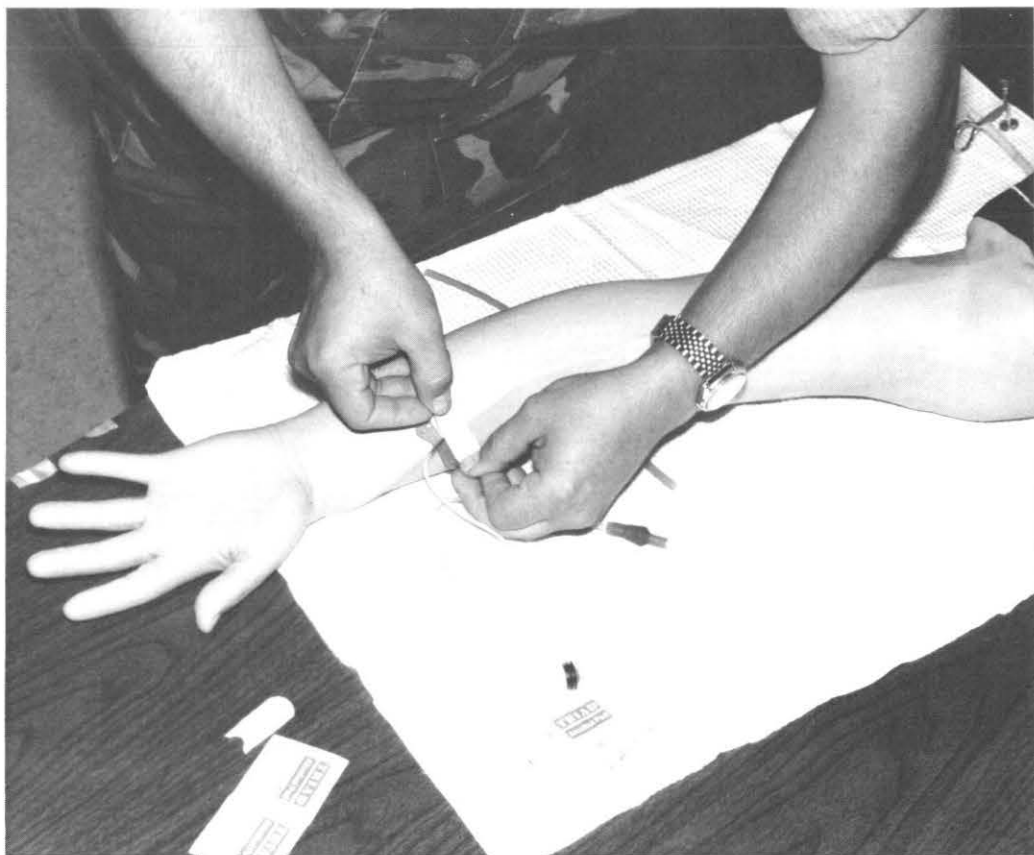
The student first examines the patient and determines the need for suturing. He or she then selects sterile instruments, needles, and suture mate-

rial. The wound area is cleaned appropriately and then the corpsman dons head cover and mask. Instructions call for a 5-minute surgical hand scrub. Throughout the technique the student follows strict sterile procedures, i.e., gloves and sterile eyelet towels for draping the wound. The wound is then "anesthetized." Using suture needles and needle holders, the student sews the yawning tissue edges together. A very thin and lifelike rubber skin, which can eventually be replaced, responds to the treatment very much the way real skin would.

The actual suturing follows a very precise regimen. "Needle holder should be approximately $\frac{1}{4}$ of the distance from the blunt end of the needle. Needle should enter the skin $\frac{1}{4}$ inch from wound edge at a 90° angle. Sweep needle through tissue in arc-like motion following the curve of the needle." These steps precede instructions for actually tying the knots and cutting the finished sutures.

Endotracheal Intubation. At a battalion aid station, the line corpsman may very well encounter a situation where he cannot establish a patent airway on a patient using natural means. Endotracheal intubation may be required to ensure the patient's survival. This procedure is taught at the next table. Again using a manikin, the student performs the procedure using both orotracheal and nasotracheal routes.

Cricothyroidotomy. On the battlefield, the need for establishing an airway may be even more critical, requiring an emergency cricothyroidotomy, the surgical placement of a breathing tube through the cricothyroid membrane into the trachea. The student locates the membrane, palpates the thyroid and cricoid cartilages to determine anatomical orientation, incises the simulated manikin "tissue," inserts an endotracheal tube, and begins ventilating the patient. Assuming that the procedure has been



HMC Hayden secures a butterfly intravenous needle into a manikin arm during IV therapy.

accomplished correctly, the manikin's "lung" will inflate.

Needle Thoracentesis and Chest Tube Insertion. Students also learn a procedure they may only be able to treat at a battalion aid station. The time might come when casualties have so swamped physicians and nurses, that a corpsman might be called upon to relieve a patient suffering severe respiratory distress such as pneumothorax. Without benefit of reference materials, the corpsman first practices a needle thoracentesis and then a chest tube insertion on another specialized manikin. As with the other procedures, there are many steps that call upon his or her knowledge of anatomy and manual skills. The needle thoracentesis requires 10 steps, the chest tube insertion, 12.

IV Therapy. One procedure the corpsman will most probably encounter at a battalion aid station or in the hospital is IV therapy. Although it is very unlikely that a battlefield scenario

will allow the luxury of administering an IV for shock, such a procedure could be performed if the corpsman or a designated marine carried IV tubing in a pack and fluids were available. The manikin arm utilized for this procedure comes complete with a basic vascular system. Following preliminary steps and insertion of the IV needle, both student and instructor can readily see whether the dyed, simulated IV fluid flows correctly into the "arm."

The student has three opportunities to "get all these procedures right." If he or she cannot master them, there will be remedial instruction later on.

Proof of the Pudding

Although the corpsman may never be called upon to perform any of these procedures on the battlefield, CAPT Lamdin points out that such training has already proven its worth. On 17 Nov 1989, HN Scott Holmes and HA Zackery Fay were on duty during a live

fire training exercise at Camp Lejeune when a 9mm tracer round was accidentally fired. The projectile passed through the neck of one nearby marine before lodging in the shoulder of another. HN Holmes first stemmed the bleeding of the marine with the shoulder wound and then waded into the crowd surrounding the more severely wounded lance corporal. Holmes determined that helicopter medevac would require too much time. Assisted by HA Fay, Holmes directed the movement of the patient into a pickup truck, where he maintained pressure on the neck wound, treated for shock, and monitored vital signs. When met by an ambulance, Holmes transferred the patient and assisted in his treatment until arrival at the hospital. For their skill, presence of mind, and professionalism, the two corpsmen received the Navy Achievement Medal. Both men were recent graduates of the Field Medical Service School. —JKH



Why Should They Know?

CDR Peggy Anne McNulty, NC, USN

LCDR McNulty (now CDR) privately examines and evaluates each child after lecture.



age were statistically significant between the groups. Group A had a much higher incidence of visits at $p = .03$ with a 97 percent confidence ratio. Group A visited a total of 816 times compared to Group B's 697 visits. The study also reflected no statistical difference for real infections needing visits in both groups. There were only 3 clients out of 151 in group A that did not visit between 6 and 12 months compared to 18 parents in group B. Only 32 clients in group A compared to 89 in group B did not utilize the clinic for viral i.e., over-the-counter remedies. There was 99 percent confidence that statistical significance existed between the two groups for viral visits with a p value of $< .01$ ($p = 0000000019$).

Informed parents can usually anticipate the needs of their infants and parent in a more positive, reassured atmosphere. It would seem that this makes perfect sense but nowhere in the literature has the rela-

tionship between increased knowledge of the parent and reduction of visits to their clinician been studied.

In a study conducted at Naval Medical Clinic, Barbers Point, HI, the researcher has studied infant visits to determine a comparison of the number and content of visits between two groups of parents. The outcome showed that the more informed parent had fewer visits and the visits were indeed problematic.

Two groups of parents were reviewed over a 6-month period. The charts of 151 infants that were seen in a Well Baby Cluster Class were randomly compared to 151 records of parents seen with individual 6-month visits conducted without a cluster lecture. Infants' charts were followed through the 12-month visit, and the two groups were studied with relationship to number, type, chronicity, and necessity of visits. Charts of active duty dependents receiving access to care in the military system were reviewed. All visits were counted

Two groups of infants were studied over a 6-month period to support the hypothesis that the more informed parent will seek health care particularly when the child is febrile or in need of other than over-the-counter remedies. With the t -test group A ($n=151$) was compared to group B ($n=151$). Group A received a 6-month well baby exam with individual providers while group B was given a 40-minute lecture preceeding their 6-month exam. Total visits seen between 6 and 12 months of

including those visits seen by private clinicians while the infant was on the mainland or otherwise unable to access the military arena. Members of all branches of the service and all ranks were included without distinction. Parents ranged from single by virtue of deployed spouse to single and married households with no distinction for the purpose of this study. Education and emotional background of parents were undetermined.

The lecture presented by the nurse practitioner to each group of parents consists of slides and/or flip charts depicting the normal growth and development for each series of classes i.e., 2, 4, 6, 12, and 18 months of age. Safety is discussed in depth with numerous handouts and distribution of Ipecac for home use. Handbooks with pictures of Hawaii's poisonous

plants are distributed due to the differences and variety of vegetation uncommon to the mainland. CPR and Heimlich films are shown with followup demonstration (parents are encouraged to become certified by attending classes at a later date).

Each series covers topics related to diet, behavior, and age-specific parenting skills. The lecture lasts approximately 40 minutes followed by a question period and the individual physical exam. Based on 3 providers, 15 to 18 children are seen in approximately 2 hours.

Visits were determined as necessary vs. unnecessary based on the following criteria:

Unnecessary visits involved infants seen for simple viral illnesses which required only over-the-counter remedies, such as vaporizer, Tylenol,

decongestants, and advice. Babies seen in this category had simple viral illnesses which parents might have been able to manage at home given prior information. These infants were afebrile. Reassurance and advice were the appropriate plan of treatment.

Necessary visits involved infants with febrile illnesses with rectal temperatures of over 101°F and/or those requiring a prescription as part of the therapy. The followup ear infection visits were also counted as visits in this category. Because of the great volume of otitis media cases, the researcher studied occurrences for comparison in each group. It was hypothesized that increased incidences of ear infections would appear in the nonlectured group due to a lack of discussion on congestion, teething, and the position of feeding.

Toddlers play during lecture presentation at the 12-month visit.



Findings

There was no significant difference in the incidences of otitis media in either group. Further research on incidences related to heredity, exposure, and allergies would be needed to explain the high incidence of otitis media in this age group.

Comparison of bacterial infections showed no significant difference between groups A and B. The mean bacterial visit in the group without the lecture series was lower than the group given the lecture (3.6 compared to 3.8). Thus, the two groups were not significantly different for real infection; however, group B (the lectured group) was sicker for general bacterial infections. Perhaps greater insight for distinguishing true illness was obtained by the parents in this group. Since many uninformed parents believe that high temperatures are part of the teething process, potential bacterial infections may have been misinterpreted by parents.

Both groups studied the frequency of visits. Of the 21 clients not seen for any episodic visit from 6 to 12 months of age, 18 were the lectured group. Comparisons between viral visits in both groups revealed that 32 parents in the nonlectured group compared to 89 in the lectured group did not return for nonacute viral visits.

Using a t-test, there was 99 percent confidence that statistical significance existed between the two groups for viral nonacute visits with a p value of $< .01$. Group A (without the lecture) had a mean viral visit rate of 1.76 compared to .73 in group B.

Looking at total visits between both groups, group A had a mean visit rate of 5.4 compared to group B's 4.6. There was 97 percent confidence that statistical significance existed between both groups for total visits with a p value of $< .03$.

During the study it was observed that those parents in a single status by virtue of deployed spouses tended to access the system more frequently. A followup study would need to be done to determine any statistical signifi-



Lectures are presented with a personal touch by McNulty.

cance with this group of individuals.

What does this all mean? Statistics have shown through this study that we are, in fact, teaching effectively to parents in a well baby setting, and the return visits reflect concerns of knowledgeable parents.

Parents deserve quality when it comes to important issues of infant assessment at this critical period of growth. These lectures provide a unique quality, thoroughness, and a feeling of a job well done without burnout for the nurse practitioner. The parent is properly guided and informed. As a provider, I feel confident that these parents truly know how to care for their infant through episodes of choking, teething, congestion, diaper rashes, and fever. Everyone wins—especially the child who is growing in a more secure environment nurtured by more confident parents who can worry less and love more.

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CDR McNulty is a pediatric and family nurse practitioner stationed at Naval Medical Clinic, Barbers Point, HI. She is currently a doctoral student at the University of Hawaii's School of Public Health and conducts an ongoing series of cluster classes for well babies as well as obese teens and adults, hypertensive and diabetic clients, and the active duty single parent.

Medical Corps Captain

JO2 Tom Hushion, USN

Though he has "retired" twice from the United States Navy, CAPT Robert E. Mitchell, MC, would just as soon stay in. However, his wife, Liz, is ready for her captain to come home. "She's the only reason I'm getting out," CAPT Mitchell stated. "I'd stay here till the day I die, and I think the Navy would probably go along with that."

Spanning 43 years of active duty service to his country, the curtain finally came down on a most distinguished career. On 29 June 1990, CAPT Mitchell became Dr. Mitchell and walked out of "his" building at the Naval Aerospace Medical Institute (NAMI), Pensacola, FL, for the last time. Actually, he'll be back. But it won't be in uniform.

Dr. Mitchell was born 19 May 1918 in Merced, CA. Before entering the Navy, he received his bachelor and master of arts degrees from the University of California at Berkeley in 1942. In 1944, he became an ensign.

After receiving his doctor of medicine and master of surgery degrees from McGill University in Montreal, Canada, Mitchell went to Naval Hospital, San Diego, CA, for internship. He then had residency training in internal medicine at naval hospitals in California. From 1952 to 1953, he re-

ceived further graduate training at Walter Reed Army Medical Center, Washington, DC.

For Mitchell the year 1955 was the start of an ongoing affair with naval aviation medicine. Designated a naval flight surgeon, he worked in the Research Division of the School of Aviation Medicine at Naval Air Station, Pensacola, FL, for 3 years. He later returned for two more tours at the School's laboratory from 1960 to 1965 and from 1969 to 1980. It was during those tours that his major research efforts began.

Over the years Dr. Mitchell has been involved in the "Thousand Aviator" project, designed to follow the careers and lives of 1,056 Navy and Marine Corps pilots over an extended period, and the repatriated Navy/Marine Corps prisoners of war program, designed to study the health of the men repatriated after being POWs in Vietnam. He is an original member of the medical team that worked with the American hostages held in Iran.

Dr. Mitchell claims the repatriated POW program as his greatest achievement. "I felt I was doing something good for them," he remembered. "They are a tremendous group of men, and I was glad to have been involved with them."

From the reaction that the Vietnam veterans received from their own country, it is nice to know that a man of Mitchell's caliber cared. He cared enough to devote the past 18 years to the POW's cause.

Dr. Mitchell retired from the Navy in 1980, but it didn't last long. "I turned over the command at 2:30 on a Friday afternoon and had gone home for the weekend," Mitchell recalled. "I came right back to work on Monday morning at 7:00."

Even though he did retire, he was never really a civilian. "The last time I was a civilian was in 1945," Mitchell stated. "I missed all of World War II except for the last few months."

The reason the Navy had Mitchell "reinstated" was that his services were still needed at NAMI. And since his return to active duty, NAMI has been his home. "We've had some real problems finding someone to take over the program," Mitchell explained. "As it happens, we've come up with an extremely good individual." Taking over as head of the special studies department at NAMI is CDR George W. Atwell, MC.

That's one thing Dr. Mitchell always stresses . . . the need for continuity in a program. And all of his programs are basically people-type

"Departs" NAMI . . . Again

studies. "You get a pretty good feel for how these people are doing," he said about the repatriated POW program, "you watch them over the years."

Now that he is out of the Navy, Dr. Mitchell plans to work on his three favorite projects and one hobby. "We have a tremendous amount of data to analyze with the Thousand Aviators, repatriated POWs, and the comparison groups," he explained, "and I intend to work on that as much as possible." His hobby is the aviation medicine exhibit in the National Museum of Naval Aviation, which he has been involved with for a few years.

Maybe a book in the future? "People ask me about a book, but I haven't really made up my mind on that," Mitchell stated. "My work with special studies will be a professional-type publication."

Senator John Glenn (R. Ohio), while addressing the Senate last October summed up Dr. Mitchell's career by saying: "I know that we can all agree that this is the biographic profile of an outstanding American who has benefited our Nation and its citizens in numerous ways over some 45 years as a naval officer, medical doctor, flight surgeon, aerospace scientist, and humanitarian. Even today he continues his hectic schedule

to the great benefit of his countrymen and the world. Dr. Mitchell, we salute you."

Faced with the prospect of free time for the first time, Mitchell insists that his work must continue. NAMI will now have to get along without him.

For people interested in a career in naval aviation medicine, Dr. Mitchell describes the following scenario as a good career path. "In order to get into aviation medicine, you'll have to go through medical school. I think a good school to get into is the Uniformed Services Program at Bethesda Naval Hospital. That's a good way to get into the system. After that, you'll go through the Flight Surgeons Training Program here in Pensacola, and that is the most direct way to do it."

The day was a typical hot and muggy Florida afternoon as Dr. Mitchell shuffled down the hallway, headed for his car. It was the last time as a captain in the Navy that he would leave through NAMI's doors. One can't help but feel that sometime, he'll be coming back through those same doors as a civilian . . . no doubt, on his way to work on a new, or old, project. □

JO2 Hushion is assigned to the Public Affairs Office, Naval Air Station, Pensacola, FL 32508-5000.

JO3 Kori Ahola



Dr. Mitchell

Highlights From the Naval Medical Research and Development Command

Bethesda, MD

• Caffeine Has Variable Effects on Diver Heat Loss

Diving medical researchers at the Naval Medical Research Institute, Bethesda, MD, are attempting to define comprehensively the physiological effects of caffeine on divers in order to make recommendations for its use in various operational diving scenarios. Caffeine increases alertness, diminishes subjective fatigue, and improves the performance of certain mental and physical tasks. Caffeine also increases the risk for certain heart rhythm irregularities and promotes dehydration by stimulating urine production. The latter effects are highly undesirable for divers. Recent work has ex-

amined the effects of caffeine on diver heat loss. It was determined that a 5 mg/kg dose of caffeine increased the rate of heat loss during light exercise at the surface in 20°C water when compared to placebo controls. However, no effect on heat loss was observed when the experiment was repeated in 31°C water. At 1,000 feet of sea water, the same dose of caffeine increased heat loss of subjects engaged in the same level of exercise in 31°C water, but not 20°C water. These contradictory and unexplained differential caffeine effects demonstrate the need for additional studies and for caution in the use of caffeine when diving.

* * *

• NDRI Developed Rapid Screening Tests for Periodontopathic Bacteria

Investigators at the Naval Dental Research Institute, Great Lakes, IL, have developed monoclonal antibodies for use in rapid screening tests for periodontopathic bacteria. Monoclonal antibodies to *Treponema denticola* and *Bacteroides gingivalis* were developed by Dr. Lloyd Simonson and his research team. These antibodies were recently used to measure quantitatively

the *T. denticola* content of subgingival plaque from samples taken from periodontitis patients with probing depths of 6 mm. The *T. denticola* content of the subgingival plaque in periodontitis patients demonstrated a two-fold elevation over healthy controls. This represents the first quantitative evidence of a positive relationship between a *specific* spirochete species and severe periodontal disease.

* * *

NAMRL Developed a Multidisciplinary Assessment Technology for Sustained Flight Operations

The Naval Aerospace Medical Research Laboratory, Pensacola, FL, developed a multidisciplinary assessment technology for sustained flight operations research. The technology consists of a fixed based simulator shell and a simulation of operationally relevant aviation tasks for a carrier attack A-6 scenario agreed to by flight operators. This capability provides for "whole

man" evaluation, consisting of selected physiological, physical, and cognitive performance tests administered during a sustained (14 hours) flight scenario. Decrements in test performance resulting from sustained time-on-task are carefully assessed. Candidate countermeasures (i.e., ways to improve performance) are systematically identified and tested to determine their efficacy in reestablishing performance to baseline levels.

For additional information on these or other medical R&D projects, contact NMRDC Code 40 at Commercial (202) 295-1468 or Autovon 295-1468.

Boot Design, Sizing, and Foot Disorders in Reservists Undergoing Field Training

CDR Neil W. Rheiner, NC, USNR
CAPT William Gondring, MC, USNR

The loss of military personnel due to medical and surgical foot and ankle problems is a significant concern to all commanders. Frequently, personnel are placed on limited duty because of failure to follow protective hygiene measures or to care for personal equipment, significantly hindering the military operation.

In an effort to determine the extent of foot injury problems and develop interventions to reduce the impact of these on operations, Naval Reserve Fleet Hospital 500 CBTZ 22 undertook a study of its troops during three field training periods. The purpose of the study was to answer the question: "Does boot design and sizing influence foot disorders in naval reservists undergoing field training?"

Footwear-related problems are one of the leading causes of limitation in duty in field units. Twenty-seven percent of the casualties to American troops in Europe in 1944-45 and 28 percent of casualties in the 1982 Falklands conflict were due to foot problems.⁽¹⁾ While the loss of 25 percent of any combat or combat support unit during field operations is of concern, it is a particular problem for Naval Reserve units during their active duty for training (ACDUTRA) periods.

Since 12-day ACDUTRA is very tightly scheduled, the missing of as little as 1 or 2 hours of training may disrupt an individual's total training. Loss of 1 or more days of training could disrupt career planning, prevent individual advancement, reduce unit

readiness, and waste government funds for training.

Setting and Sample

The research was conducted at an active duty Navy training facility in the desert in southern California. Training consisted of both classroom and field operations necessary in setting up TEMPRA tents and equipment to establish and operate a fleet hospital.

The sample consisted of 335 naval personnel ranging in age from 18 to 58 years with a mean age of 32. Sixty-two (18.5 percent) of the sample were officers and 273 (81.5 percent) were enlisted personnel. Two hundred eighteen (61.5 percent) of the sample were male and 117 (34.9 percent) were female.

TABLE 1
Frequency of Foot Problems Experienced

<i>Problem</i>	<i>Number</i>	<i>Percent</i>
1. Simple foot aches	78	23.3
2. Blisters	31	9.3
3. Ankle pain	27	8.1
4. Toenail problems	27	8.1
5. Swelling	25	7.5
6. Calluses	23	6.9
7. Athletes foot	23	6.9
8. Midfoot pain	21	6.3
9. Forefoot pain	20	6.0
10. Hindfoot pain	20	6.0
11. Shin pain	18	5.4
12. Corns	14	4.2
13. Skin rashes	10	3.0
14. Warts	5	1.5

Methodology

Medical officers who had extensive field experience constructed a questionnaire. The form included questions related to foot size, boot size requested, boot size issued, whether boots were broken in before the field experience, foot hygiene, and foot problems experienced. The questionnaire was administered the second week of the field exercise during each of three training periods. All subjects participating in the study wore the standard military combat boot. All data were entered into a mainframe computer and frequencies, means, cross-tabulations, and Pearson Product Moment Correlations were obtained.

Findings

Two hundred sixty-two (78.2 percent) of the 335 individuals surveyed had worn boots before the

training evolution and 271 (80.9 percent) attempted to break in their boots before arriving at the training site. More than 90 percent of the subjects had received the sized boot they requested. Thirty-four (10.1 percent) exchanged their boots for another size. One hundred sixty-two (48.1 percent) of the subjects were runners. Forty-four (13.1 percent) ran in their boots during the training period while the remainder wore running shoes.

One hundred fifty-two (45.4 percent) of the sample indicated they had one or more of the foot problems surveyed. Table 1 depicts those foot problems experienced by subjects in descending order. The most frequently experienced problems were simple foot aches, blisters, ankle pain, and toenail problems.

In examining relationships between variables, Pearson Product Moment

Correlations of $p < 0.05$ were accepted as being significant. The relationships between variables is revealed in Table 2. Twenty-five (7.5 percent) of the subjects changed their socks less than once a day, 305 (91.0 percent) changed their socks once a day, and five (1.5 percent) changed their socks twice a day. Foot medications were used by 73 (21.8 percent) of the subjects. Medication used included alcohol ($n=1$, 0.3 percent), foot pads ($n=42$, 12.5 percent), and creams or powders ($n=30$, 9.0 percent).

Factors Influencing Findings

Relatively few factors in the methodology had a negative influence on the findings. Of course, whenever data is collected by questionnaire it is always possible that some subjects will misinterpret questions; however, a sample of 335 subjects should be large enough to mediate these errors. The

TABLE 2
Pearson Correlation Coefficients

	Wore Boots Previously	Wore Current Boots	Boot Size Requested	Boot Size Issued	Broke Boots In	Running	Changing Socks	Foot Medications	Cushion Insoles
Blisters	0.068	0.099	0.153	0.116	0.102	0.04333*	-0.10014	0.26583	-0.03155*
Calluses	0.105	0.082	-0.091	-0.078	0.093	-0.08227	-0.05153*	0.00517*	0.01590*
Swelling	-0.015*	0.018*	0.164	0.156	0.080	0.06787	-0.05782	0.21403	-0.03907*
Warts	0.005*	0.007*	0.043*	0.045*	0.002*	0.07869	-0.02506*	0.04383*	0.08173
Corns	0.037*	0.041*	-0.092	-0.088	0.063	0.00811*	-0.04252*	0.02352*	0.07890
Toenail Problems	0.023*	0.003*	-0.000*	-0.013*	0.004*	-0.06532	0.01451*	0.02445*	-0.01437*
Simple Aches	-0.051*	-0.072*	0.118	0.116	0.070	-0.06342	0.00827*	0.13799	-0.02201*
Skin Rashes	0.007*	-0.072	0.023*	0.018*	0.048*	0.07703	-0.03571*	0.16209	0.04617*
Athletes Foot	0.028*	-0.022*	-0.160	-0.170	-0.078	-0.04852*	0.10575	0.01621*	0.05254*
Ankle Pain	-0.135	-0.153	0.115	0.131	0.004*	0.04442*	-0.02288*	0.07116	-0.03634*
Shin Pain	-0.034*	0.065	0.086	0.092	0.082	-0.04374*	-0.04851*	0.08861	0.12108
Forefoot Pain	-0.050*	-0.044*	0.077	0.079	-0.069	-0.09108	-0.00834*	0.07183	-0.03467*
Midfoot Pain	-0.042*	-0.036*	0.041*	0.072	0.007*	0.02237*	-0.09465	0.11656	-0.02077*
Hindfoot Pain	-0.050*	-0.013*	0.115	0.112	-0.069	-0.06586	-0.05130*	0.05394*	0.01583*
Medication Use	-0.035*	-0.055	0.104	0.105	0.036*	0.03199*	-0.04315*	1.00000	0.04389*
Running	-0.042*	-0.063	0.039*	0.036	-0.003*	1.00000	-0.03284*	0.03199*	-0.00543*
Running Footwear	0.055	0.065	-0.079	-0.077	0.012*	-0.94059	0.00795*	-0.05641	0.01450*

*p<0.05

major problems experienced in analyzing data dealt with boot size requested and boot size issued. Some of the females requested boots by female size and others by male boot size. This inconsistency in how females ordered boots caused an inaccurate relationship between boot size requested and boot size issued.

The cross-tabulations of this data demonstrated that more than 90 percent of the individuals received the boot size requested even with the above mentioned discrepancy. It is therefore possible to state that over 90 percent of the subjects received the size boot they requested, but the exact percentage could not be calculated.

Interpretation of Data

An unacceptable number of subjects reported foot problems, 152 (45.4 percent). No single factor studied in this project demonstrated a consistent relationship with these problems. No relationship was found between boot size and the incidence of foot problems. Over 90 percent of the subjects received the size boot they requested and only 34 (10.1 percent) of the total sample exchanged their boots for another size.

Breaking in boots did not reduce the incidence of foot problems; in fact, those individuals who attempted to break in their boots reported a higher incidence of foot problems. This in-

consistency may be due to these individuals being more aware of the need for proper foot care, as supported by the fact that 60 (33.0 percent) of the 271 subjects breaking in boots used foot medications while only 13 (3.8 percent) of the subjects who did not break in their boots used medications.

Subjects who had worn boots previously had a lower incidence of foot discomforts but a higher incidence of swelling, toenail problems, and skin lesions.

Those subjects who changed their socks more frequently had a significantly lower incidence of foot problems. They reported a high incidence of toenail problems and simple aches.

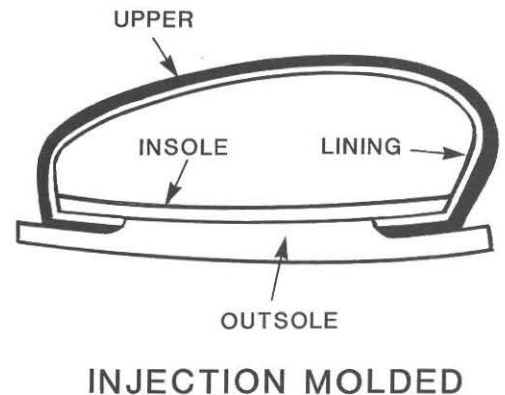
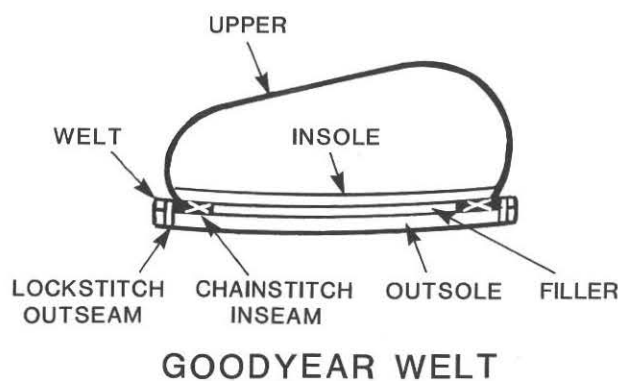


Figure 1. Cross section of boot vamp construction.

Subjects who used foot medications reported a higher incidence of those foot problems that one would expect to require the use of foot medications to increase comfort. The wearing of boots with cushion insoles reduced blisters, swelling, toenail problems, simple aches, and midfoot and hind-foot pain.

Areas for Future Study

Boot design remains a probable major contributing factor to the development of foot problems. Research at Michigan State University indicates that footwear design not only contributes to foot discomfort but will affect comfort in the ankle, knee, and hip.⁽²⁾ Military boot construction falls into two categories: Goodyear Welt construction and injected molded construction.

Goodyear Welt construction has a welt sewn around the sole to seal the seam between the boot sole and boot upper. Additionally, the Goodyear Welt construction has a felt foam filler between the inside lining, next to the foot, and the outer sole of the boot. The result of using the filler is the more the boot is worn, the more the inside footbed conforms to an individual's foot (see Figure 1). This promotes a more comfortable, adaptable foot base compatible to running and other high use activities.

In the injected molded construction the boot upper is molded to the sole with heat. This method of construction is less expensive, more waterproof, and some sole compositions are more durable. The inside footbed does not conform to the foot, however, due in part to the lack of a foam filler. The problem can be best overcome with the addition of a contoured footbed insole.⁽³⁾ This type construction is a more nonforgiving type of boot and is much less adaptable for preexisting foot problems. Current military boots are of the injected molded construction.

The goal for a military boot should be to support the foot, ankle, and lower leg in a desired position and redistribute weight-bearing patterns for comfort, protection, and running. While current military boot design has produced a less expensive and more waterproof boot, design has not kept pace with technological advances in footwear.

Recent technological advancements in midsole design and construction for athletic footwear have brought together the features of flexibility, cushioning, shock absorption, support, stability, and motion control all in one shoe design. These shoes are so effectively designed that they are being recognized by orthopedists and podiatrists as alternatives to much more

expensive orthopedic shoes in treatment of foot abnormalities.^(4,5)

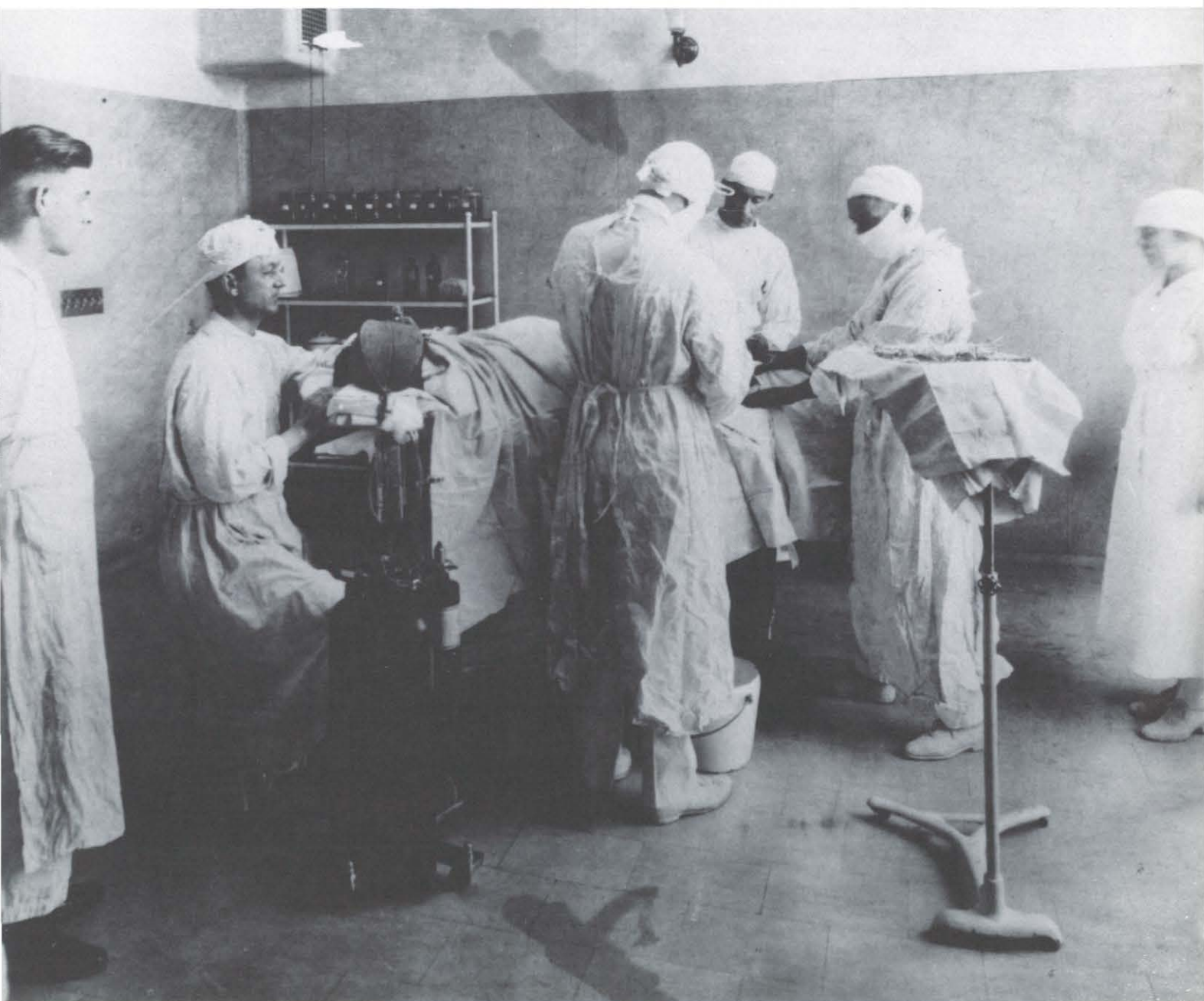
While the production of a military boot designed with current technology might markedly increase the cost of the boot, the probable reduction of a 25-45 percent casualty rate in field operations would easily balance that cost. The positive results of adapting athletic footwear to orthopedic and podiatric treatment lends support to the idea of developing and testing a new military boot design using current technology.

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